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UNITED STATES DEPARTMENT OF COMMERCE  
Patent and Trademark Office  
ASSISTANT SECRETARY AND COMMISSIONER OF  
PATENTS AND TRADEMARKS  
Washington, D.C. 20231

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Paper No. 12

Serial Number: 09/759,425  
Filing Date: 01/12/01  
Appellant(s): Bart F. Rice

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Technology Center 2600

Edward J. Radlo  
For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed July 16, 2002.

(1) *Status of claims.*

The statement of the status of claims contained in the brief is correct.

(2) *Status of Amendments After Final.*

An amendment after final has been filed February 13, 2002 and has not been entered.

(3) *Summary of invention.*

The summary of invention contained in the brief is correct.

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(4) *Issues.*

The appellant's statement of the issues in the brief is correct.

(5) *Grouping of claims.*

The examiner disagrees with the appellants contention that there are three grouping but rather believes that the claims stand or fall together as a single group since all claims are drawn to disembodied signals.

(6) *Claims appealed.*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(7) *Prior Art of record.*

The prior art of record is relied upon in the rejection of claims under appeal.

Number	Name	Date
US 4,862,479	Hamatsu et al	August 29, 1989
US 5,031,173	Short et al	July 9, 1991

(8) *New prior art.*

No new prior art has been applied in this examiner's answer.

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(9) *Grounds of rejection.*

The following ground(s) of rejection are applicable to the appealed claims.

1. 35 U.S.C. § 101 reads as follows:

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title".

2. Claims 2-19 are rejected under 35 U.S.C. 101 because the claims are drawn to non-statutory subject matter because signals are outside the four statutory classes of invention. Signals are neither a manufacture nor a composition of matter as appellant alleges but a transitory emanation of a previously patented apparatus and method. Once a signal has left a transmitter, nothing in that signal can tie it to a specific process or apparatus out of the plurality of processes or apparatuses which could have produced it, hence those limitations are meaningless. The appellant has produced no evidence to the contrary. This attempt to patent signals in free space is akin to patenting an audio or television program or **any other signal** in free space after transmission but before reception. There is no reason why these transitory and ephemeral emanations should be included in the four statutory classes of invention.

What is patentable? Despite the request by the applicant in the parent case that the Examiner provide authority for a

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holding that transitory emanations which can exist in the United States for no more than a two hundredths of a second(Divide width of United States by the speed of light), the appellant has been unable to cite any authority stating that signals per se are included within the four statutory categories of invention. Since competent authority is silent, the decision with respect to this case will set useful precedent for others to follow. Any signal in free space is transitory, ephemeral and not useful without transmission or reception. It is a short lived intermediate having no utility in and of itself without the process and apparatus of transmission or reception. The examiner respectfully suggests that they are the later and hence not statutory. The Board of appeals has previously agreed with the Examiner in the affirmance dated 3/24/99(Copy included). At the bottom of page 18 of the decision in the parent case, the Board goes on to say "Even if the signal were in a wire, which requires the movement of physical matter such as electrons, the signal is the propagating disturbance in the medium, not the medium itself. Therefore we cannot agree with appellants argument that the claimed subject matter fits within the category of composition of matter". The addition of the term electromagnetic is merely descriptive of the type of signal and the signal remains disembodied nonetheless. There is no media on which the signal is embodied. It remains unpatentable.

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The claims are drawn to non-statutory subject matter because signals are outside the four statutory classes of invention. Signals are neither a manufacture nor a composition of matter as appellant alleges but a transitory emanation of a previously patented apparatus and method. Further certain of the claims, e.g. claim 2, attempt to tie these emanation to a specific process or apparatus. Once a signal has left a transmitter, nothing in that signal can tie it to a specific process or apparatus out of the plurality of processes or apparatuses which could have produced it, hence those limitations are meaningless. The appellant has produced no evidence to the contrary. There is no reason why these transitory and ephemeral emanations should be included in the four statutory classes of invention.

3. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same

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person or subject to an obligation of assignment to the same person.

4. Claims 2-19 are rejected under 35 U.S.C. § 103 as being unpatentable over Hamatsu et al or Short et al.

Regarding claims 2-4, Hamatsu et al or Short et al (See Fig. 1 of either) disclose a composite spreading code produced from shift registers substantially as claimed. The differences between the above and the claimed invention is the absence of specifics of the carrier wave. At. Col. 5, lines 45-50 of Short et al, it is stated that the transmission can be either AM or Fm. It is obvious that either are typically sinusoids. It would have been obvious to the person having ordinary skill in this art to provide a similar arrangement for Hamatsu et al or Short et al because it is conventional and standard practice to employ a sinusoidal carrier for composite spreading signals and these components are no more than the conventional equivalents of what is disclosed in the primary items of evidence. The deficiencies of the art with respect to some of the dependent claims deal with the conventional spread spectrum communication protocols.

(10) *New ground of rejection.*

This Examiner's Answer does not contain any new ground of rejection.

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(11) *Response to argument.*

The appellant has made no arguments specifying the errors in the rejection under 35 USC 103 and no specific limitations in the rejected claims which are not described in the prior art relied on in the rejection, and thus is believed to have acquiesced thereto.

Applicant's arguments with respect to the rejection under 35 USC 101 have been considered but are considered to be more specific than the claimed invention. With respect to patent 5,568,202, it is noted that the "electronic reference signal" is embodied "in a system". Therefore it is not similar to the claims. The slide 17 requires that the medium is not as important as whether the functionality of the software (or signal) is embodied or disembodied on a medium. The current claims are disembodied and hence not patentable. Restriction to a medium, a system or the element of a process wold make the claims patentable.

The issues in this appeal are basic and fundamental tenets upon which the determination of patentability rests. What is patentable? Despite the request by the appellant that the Examiner provide authority for a holding that transitory emanations which can exist in the United States for no more than a two hundredths of a second(Divide width of United States by the speed of light), the appellant has been unable to cite any

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authority stating that signals per se are included within the four statutory categories of invention. Since competent authority is silent, the decision with respect to this case will set useful precedent for others to follow. Any signal in free space is transitory, ephemeral and not useful without transmission or reception. It is a short lived intermediate having no utility in and of itself without the process and apparatus of transmission or reception. The examiner respectfully suggests that they are the later and hence not statutory. For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

S. Cangialosi  
October 17, 2002

Edward J. Radlo  
Fenwick and West LLP  
Two Palo Alto Square  
Palo Alto California 94306



WELLINGTON CHIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600  
*CONFERT*



SALVATORE CANGIALOSI  
PRIMARY EXAMINER  
ART UNIT 222



DOUGLAS OLMS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600

*35VSC 601 - SIGNAL person and SIGNAL PRODUCE  
BY PROCESS*

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Ex parte BART F. RICE

Appeal No. 95-3029  
Application 08/003,996<sup>1</sup>

ON BRIEF

Before BARRETT, FLEMING, and TORCZON, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 2-51. Claim 1 has been canceled.

We affirm.

<sup>1</sup> Application for patent filed January 15, 1993, entitled "Spread Spectrum Transceiver," which is a division of Application 07/766,372, filed September 27, 1991, now U.S. Patent 5,210,770, issued May 11, 1993.

BACKGROUND

The disclosed invention is directed to a signal and a signal produced by a certain process (product-by-process).

Claims 2 and 16 are reproduced below.

2. An assembly of simultaneously transmitted signals, said signals being related to each other in said assembly so as to communicate information to a receiver, said signals being structured so as to contain corresponding subsets of a set of binary spreading-code sequences, at least one subset of said set of binary spreading-code sequences containing more than one of said binary spreading-code sequences, each subset of said set of binary spreading-code sequences embodying a corresponding portion of said information.

16. An assembly of simultaneously transmitted signals, said signals being related to each other in said assembly so as to communicate information from a transmitting node to a receiving node of a communication network, said assembly of signals being produced by a process of:

- a) assigning blocks of bits embodying said information to corresponding subsets of a set of binary spreading-code sequences, at least one of said subsets of said set of binary spreading-code sequences containing more than one of said binary spreading-code sequences; and
- b) simultaneously transmitting selected subsets of said set of binary spreading-code sequences from said transmitting node to said receiving node.

No prior art is relied on in the rejection.

Claims 2-51 stand rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter. The examiner states that the claims do not fall within any of the four statutory classes of subject matter (Examiner's Answer, page 3). The

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application was remanded by order entered May 14, 1996, (Paper No. 16), to reconsider the rejection under 35 U.S.C. § 101 in view of the Patent and Trademark Office (PTO) Examination Guidelines for Computer-Related Inventions (Guidelines), 1184 Off. Gaz. Pat. & Trademark Office 87 (March 26, 1996). The examiner responded that he could not find where the Guidelines apply to this case (Paper No. 17).

We refer to Final Rejection (Paper No. 7) (pages referred to as "FR\_\_") and the Examiner's Answer (Paper No. 14) (pages referred to as "EA\_\_") for a statement of the examiner's position and to the Brief (Paper No. 13) (pages referred to as "Br\_\_") for a statement of appellant's position.

#### OPINION

##### Grouping of claims

Claims 2-15 are stated to stand together and claims 16-51 are stated to stand together. We choose claim 2 to be representative of claims 2-15 and claim 16 to be representative of claims 16-51. Accordingly, claims 3-15 will be presumed to stand or fall together with independent claim 2 and claims 17-51 will be presumed to stand or fall together with independent claim 16. See 37 CFR § 1.192(c) (5) (1994).

##### Signals per se and product-by-process claims

Claim 2 is directed to a signal per se, i.e., a signal that is not tied to any physical structure for transmitting or

receiving the signal and a signal that does not have any specified physical characteristics. Appellant does not contend otherwise. For the reasons discussed infra, signals per se are held to be nonstatutory subject matter.

Claim 16 is a product-by-process claim where the product is a signal per se. We are not aware of any case law dealing with how to treat product-by-process claims for statutory subject matter analysis. Product-by-process claims are treated differently for patentability purposes during ex parte examination in the PTO than for infringement and validity purposes during litigation. See Atlantic Thermoplastics Co. Inc. v. Faytex Corp., 970 F.2d 834, 846, 23 USPQ2d 1481, 1490-91 (Fed. Cir. 1992). The patentability of product-by-process claims is discussed in In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985):

[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. [Citations omitted.]

The patentability of a product does not depend on its method of production. If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the product was made by a different process. [Citations omitted.]

We prefer to be conservative where new claim issues are involved because it is difficult to stop a practice once it has been approved. Therefore, by analogy, we determine whether or not appellant's product-by-process claims recite statutory

subject matter based on the product itself. For the reasons discussed infra, signals per se are held to be nonstatutory subject matter.

Signals per se are nonstatutory subject matter

It is noted that appellant received U.S. Patent 5,210,770 ('770 patent), issued May 11, 1993, on the parent application. The '770 patent claims a method and apparatus for communication in a spread spectrum network. Appellant does not state why claims to a signal per se are necessary or why the invention is not adequately protected by the method and apparatus. This is one of several pending cases seeking to patent signals per se, apparently to test or expand the boundaries of statutory subject matter. See, e.g., prosecution history of Koo, U.S. Patent 5,568,202, issued October 22, 1996, in which a rejection of claims to a signal per se under § 101 was affirmed by the Board. In Koo, after a premature appeal to the Federal Circuit, the claims were allowed after the claim was amended to recite "wherein said reference signal is embodied in a processor readable memory" following the holding in In re Lowry, 32 F.3d 1579, 32 USPQ2d 1031 (Fed. Cir. 1994), wherein claims to a data structure stored in memory were held to be statutory subject matter because of the statutory nature of the memory. No memory or other physical structure is claimed here and our decision is not controlled by Lowry.

This is a difficult case because there are no cases that address whether signals per se are statutory subject matter. The easy solution would be to reverse the rejection. However, because signals per se are so different from conventional statutory subject matter, and because we foresee problems in patenting this kind of subject matter which has no tangible structure, we believe the cautious approach is to sustain the rejection and let the issue be resolved by the Federal Circuit.

As background to the analysis, we define some basic concepts of the physical world. As explained in Gillespie et al., Chemistry 2 (Allyn and Bacon, Inc. 1986):

We can describe the universe, and all the changes occurring in it, in terms of two fundamental concepts: matter and energy. Matter is anything that occupies space and has mass. Water, air, rocks, and petroleum, for example, are matter, but heat and light are not; they are forms of energy. The many different kinds of matter are known as substances. . . .

When we refer to "structure" or "material" or "substance" we are talking about matter and things made up of matter. Energy is further defined at Chemistry 53:

The capacity to do work is called energy. Gasoline, for example, possesses energy because when it is burned, it can do the work of moving a car. We measure energy by the work done, and thus energy, like work, is measured in joules.

In practice, it is convenient to distinguish different forms of energy, such as heat energy, light energy, electric energy, and chemical energy. . . .

Energy has physical existence because it is capable of doing work and of being measured, but it is incorporeal.

Some definitions of "signal" are "the physical embodiment of a message" or "[t]he event or phenomenon that conveys data from one point to another," IEEE Standard Dictionary of Electrical and Electronics Terms (Wiley-Interscience 1972).

"Signal" is also defined as "[t]he physical representation of data" and "[t]he physical representation which conveys data from one point to another," The New IEEE Standard Dictionary of Electrical and Electronics Terms (IEEE, Inc., 5th ed. 1993).

"Signal" is also defined as "[a] representation of information conveyed by a carrier," "[d]etectable transmitted energy that can be used to carry information," "[a] time-dependent variation of a characteristic of a physical phenomenon used to convey information," and "[t]he code or pulse that represents intelligence, a message, or a control function conveyed over a communication system," Communications Standard Dictionary (Chapman & Hall, 3d ed. 1996). While these definitions require a physical existence, there is a long history of referring to numbers (data) as signals in mathematical algorithm patent cases to avoid a nonstatutory subject matter rejection. See Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673 (claim 8 to "method of converting signals from binary coded decimal form into binary" was not a "process" under 35 U.S.C. §§ 100(b) and

101); In re Walter, 618 F.2d 758, 770, 205 USPQ 397, 409 (CCPA 1980) ("The 'signals' processed by the inventions of claims 10-12 may represent either physical quantities or abstract quantities; the claims do not require one or the other.").

The physical nature of the signal is not positively recited in the claims. Claim 2 recites "[a]n assembly of simultaneously transmitted signals." In our opinion, this can be interpreted to mean that the signals having the information properties of the claim are intended to be simultaneously transmitted and does not positively require that the signals are in transit through some physical phenomenon between the transmitter and receiver. Therefore, claim 2 can be interpreted as directed to the abstract arrangement (which appellant refers to as "structure," claim 2, line 4) of subsets of a set of binary spreading-code sequences. However, we alternatively address the signals as physical signals, although the physical signal must be interpreted broadly because claim 2 does not recite how or through what phenomenon the signals are transmitted; nor does claim 2 specify any physical characteristics of the signal, such as amplitude, frequency, or other properties. Figures 10 and 11 of the specification show a radio transmitter and receiver, but this is not claimed. Claim 16 recites "[a]n assembly of simultaneously transmitted signals" and recites "simultaneously transmitting selected

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subsets of said set of binary spreading-code sequences from said transmitting node to said receiving node." Claim 16 recites transmission of the signal and requires some kind of unspecified physical signal. Appellant argues that the signal is embodied in an electromagnetic wave without pointing to any supporting language in claims 2 or 16. In summary, we address the signals as both abstract arrangements and as physical embodiments of information.

The issue is whether a signal per se is patentable subject matter under 35 U.S.C. § 101.

The starting point for nonstatutory subject matter analysis is the statute, 35 U.S.C. § 101, and the Supreme Court's basic principles as enunciated in Diamond v. Diehr, 450 U.S. 175, 209 USPQ 1 (1981), which are summarized in In re Warmerdam, 33 F.3d 1354, 1358, 31 USPQ2d 1754, 1758 (Fed. Cir. 1994):

Despite the oft-quoted statement in the legislative history of the 1952 Patent Act that Congress intended that statutory subject matter "include anything under the sun that is made by man," S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952), reprinted in 1952 U.S.C.C.A.N. 2394, 2399; H.R. Rep. No. 1923, 82d Cong., 2d Sess., 6 (1952), Congress did not so mandate. Congress included in patentable subject matter only those things that qualify as "any . . . process, machine, manufacture, or composition of matter, or any . . . improvement thereof. . . ." 35 U.S.C. § 101. . . .

To include some things is to exclude others. The chore of defining exactly what is excluded under § 101, and applying such definitions to specific cases, has caused courts to expend much effort in trying to find the

right words to describe some rather abstract notions. In Diamond v. Diehr, 450 U.S. 175 (1981), the Supreme Court summarized the scope of the § 101 exclusion and the Court's prior efforts at describing it by saying "[e]xcluded from such patent protection are laws of nature, natural phenomena, and abstract ideas. . . . Our recent holdings in Gottschalk v. Benson and Parker v. Flook, both of which are computer-related, stand for no more than these long-established principles." Id. at 185.

Subject matter within one or more of the classes of § 101 is nonstatutory if it falls within one of the exclusions. See In re Pardo, 684 F.2d 912, 916, 214 USPQ 673, 677 (CCPA 1982) ("[A]ny process, machine, manufacture, or composition of matter constitutes statutory subject matter unless it falls within a judicially determined exception to section 101."); In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) ("[A] series of steps is a 'process' within § 101 unless it falls within a judicially determined category of nonstatutory subject matter exceptions."). The most common example involves mathematical algorithms. A mathematical algorithm is a "procedure for solving a given type of mathematical problem," Gottschalk v. Benson, 409 U.S. at 65, 175 USPQ at 674. Because a mathematical algorithm is claimed as a series of steps, it is a "process" under § 101 unless it fits within one of the exclusions for "laws of nature, natural phenomena, and abstract ideas." Therefore, one way to prove nonstatutory subject matter is to show that it fits within a recognized exclusion.

We have found no statements in the case law that all subject matter made by man can be placed into one of the four classes of statutory subject matter of § 101; nor have we found any statements that "laws of nature, natural phenomena, and abstract ideas" represents an exhaustive set of statutory subject matter exclusions. By our analysis, out of the universe of all subject matter made by man, some may not fall within the four statutory classes of "process, machine, manufacture, or composition of matter" in § 101 and, also may not fall within one of the three exclusions for "laws of nature, natural phenomena, and abstract ideas." Stated differently in terms of set theory, the set of subject matter represented by the four statutory classes of "process, machine, manufacture, or composition of matter" in § 101 represents a subset of the universe of all subject matter made by man, and the set of subject matter within the three exclusions for "laws of nature, natural phenomena, and abstract ideas" is a subset of the universe of all subject matter made by man that partially overlaps the four statutory classes. Therefore, in our opinion, a second way to prove nonstatutory subject matter is to show that it does not fall within one of the defined statutory classes of § 101, regardless of whether or not it falls within one of the three exclusions. A poem is an example of man-created subject matter that does not fall within the

four categories of nonstatutory subject matter and does not appear to fall within the exclusions.

We analyze the claimed signal under definitions of the four statutory classes of "process, machine, manufacture, or composition of matter" in § 101. The broad language of § 101 is intended to delineate a "general industrial boundary" of patentable invention. See In re Bergy, 596 F.2d 952, 974 n.11, 201 USPQ 352, 372 n.11 (CCPA 1979), vacated, 444 U.S. 1028, aff'd sub nom., Diamond v. Chakrabarty, 447 U.S. 303, 206 USPQ 193 (1980). The first statutory class, process, is defined in 35 U.S.C. § 100(b) and refers to acts, while the last three classes, machine, manufacture, and composition of matter, refer to physical things. Id. See also 1 D. Chisum, Patents § 1.02 (1994) (The three classes of machine, manufacture, and composition of matter "relate to structural entities and can be grouped as 'product' claims in order to contrast them with process claims.").

The signal of claim 2 is clearly not a "process" because it is not a series of steps. Claim 16 is a product-by-process claim, not a "process" claim even though it has process steps.

The three product classes have traditionally required physical structure or matter. "The term machine includes every mechanical device or combination of mechanical device or combination of mechanical powers and devices to perform some

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function and produce a certain effect or result." Corning v. Burden, 56 U.S. (15 How.) 252, 267 (1854). A modern definition of machine no doubt includes electronic devices which perform functions. Indeed, devices such as flip-flops and computers are referred to in computer science as sequential machines. The claimed signal has no tangible physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine.

A "composition of matter" "covers all compositions of two or more substances and includes all composite articles, whether they be results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids." Shell Development Co. v. Watson, 149 F. Supp. 279, 280, 113 USPQ 265, 266 (D.D.C. 1957), aff'd, 252 F.2d 861, 116 USPQ 428 (D.C. Cir. 1958). The claimed signal is not matter, but at best a form of energy, and therefore is not a composition of matter.

The Supreme Court has read the term "manufacture" in accordance with its dictionary definition to mean "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery."

Diamond v. Chakrabarty, 447 U.S. at 308, 206 USPQ at 196-97 (quoting American Fruit Growers, Inc. v. Brogdex Co., 283 U.S. 1, 11, 8 USPQ 131, 133 (1931)), which, in turn, quotes

the Century Dictionary). Other courts have applied similar definitions. See American Disappearing Bed Co. v. Arnaelsteen, 182 F. 324, 325 (9th Cir. 1910), cert. denied, 220 U.S. 622 (1911). These definitions require physical substance, which the claimed signal does not have. Congress can be presumed to be aware of an administrative or judicial interpretation of a statute and to adopt that interpretation when it re-enacts a statute without change. Lorillard v. Pons, 434 U.S. 575, 580 (1978). Thus, Congress must be presumed to have been aware of the interpretation of manufacture in American Fruit Growers when it passed the 1952 Patent Act.

A manufacture is also defined as the residual class of product. 1 Chisum, § 1.02[3] (citing W. Robinson, The Law of Patents for Useful Inventions 270 (1890)). A product is a tangible physical article or object, some form of matter, which the claimed signal is not. That the other two product classes, machine and composition of matter, require physical matter is evidence that a manufacture was also intended to require physical matter. A signal, at best a form of energy, does not fall within either of the two definitions of manufacture.

Continuing to look at the § 101 class of manufacture, in In re Hruby, 373 F.2d 997, 153 USPQ 61 (CCPA 1967), the CCPA held that there was no distinction between the meaning of "manufacture" in § 101 and "article of manufacture" in § 171

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for designs. The issue in Hruby was whether that portion of a water fountain which is composed entirely of water in motion was an article of manufacture. The CCPA relied on the analysis of the term manufacture in Riter-Conley Mfg. Co. v. Aiken, 203 F. 699 (3d Cir.), cert. denied, 229 U.S. 617 (1913), a case involving a utility patent. The CCPA stated in Hruby, 373 F.2d at 1000, 153 USPQ at 65:

The gist of it is, as one can determine from dictionaries, that a manufacture is anything made "by the hands of man" from raw materials, whether literally by hand or by machinery or by art.

The CCPA held that the fountain was made of the only substance fountains can be made of--water--and determined that designs for water fountains were statutory. Articles of manufacture in designs manifestly require physical matter to provide substance for embodiment of the design. Since an "article of manufacture" under § 171 has the same meaning as "manufacture" under § 101, it is inevitable that a manufacture under § 101 requires physical matter.

Some indirect evidence that Congress intended to limit patentable subject matter to physical things and steps is found in 35 U.S.C. § 112, sixth paragraph. The sixth paragraph states that an element in a claim for a combination may be expressed as a "means or step" for performing a function and will be construed to cover the corresponding "structure, material, or acts described in the specification and

equivalents thereof." This indicates that a limitation will normally recite "structure, material, or acts." "Structure" and "material" indicate tangible physical things made of matter, not energy. A signal per se does not fit within the type of subject matter that was intended to be patented.

If the signal of claim 2 is interpreted as an abstract arrangement "to be" transmitted, rather than a physical signal in transit between a transmitter and receiver, the signal would not fit into any of the four statutory categories because it has no physical existence. Furthermore, it would fit within the judicially recognized exception for "abstract ideas" and is nonstatutory for this additional reason. A physical signal does not fit clearly within one of the three Diehr exclusions of "laws of nature, natural phenomena or abstract ideas." The electromagnetic wave or voltage which carries a signal is a form of natural phenomena, but the signal being carried is not naturally occurring. However, as previously discussed, the exclusions are not controlling because subject matter must first fall within § 101 before the exclusions are applied to keep it out. Some subject matter may not fall within the four statutory classes of § 101 or within one of the exceptions.

For the reasons stated above, we conclude that the signals of claims 2-51 are not statutory subject matter under § 101 because they are abstract ideas or because they do not fit

within any of the statutory classes. It is noted that electrical signals had been around for a long time prior to the 1952 Act as evidenced by claim 8 in O'Reilly v. Morse, 56 U.S. (15 How.) 62 (1854) to the use of electromagnetism for printing intelligible characters at any distances. Thus, this case is not analogous to the situation where the technology of the invention could not have been foreseen. Cf. Diamond v. Chakrabarty. An important point too is that appellant has not been foreclosed from getting patent protection for the application of the claimed signal in a statutory apparatus or process as evidenced by U.S. Patent 5,210,770.

We do not believe this analysis is affected by the Federal Circuit's decision in State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998). A signal per se, whether an abstract arrangement of information or a physical manifestation of information, does not produce a "useful, concrete and tangible result" until it is coupled with physical structure.

#### Appellant's arguments

Appellant parses the statement of the rejection in the Final Rejection into three parts. We follow appellant's organization.

(1)

The examiner states (FR2): "Claims 2-51 are rejected under 35 U.S.C. 101 because they are drawn to non-statutory subject matter because signals are outside the four statutory classes of invention. Signals are not a manufacture as applicant alleges but a transitory emanation of a previously patented apparatus and method."

Appellant argues (Br3): "Electromagnetic signals are real; they are physical. They are particles as well as waves." It is true that electromagnetic signals are characterized by variations of electric and magnetic fields and have a physical existence that is capable of being detecting. However, the claims do not recite an electromagnetic signal or any specific physical way of transmitting the signal. It is true that electromagnetic waves have a wave-particle duality. However, the "particle" is not matter in the sense of one of the atomic elements, such as iron, or an atomic particle, such as electrons. Even if the signal were a signal in a wire, which requires movement of physical matter such as electrons, the signal is the propagating disturbance in the medium, not the medium itself. Therefore, we do not agree with appellant's argument (Br5) that the claimed subject matter fits within the category of a "composition of matter."

Appellant argues that "[a]n assembly of signals as defined by claims 2 through 51 is clearly man-made, and therefore is a 'manufacture' in the sense of 35 U.S.C. 101" (Br5). Because we hold that a "manufacture" requires physical matter, we conclude that the claimed signal is not a "manufacture."

Appellant argues that "support for Applicant's conclusion that signals per se (if properly claimed) are within the scope of patentable subject matter is implicit in a number of cases decided by the Court of Customs and Patent Appeals (CCPA) and its successor court, the Court of Appeals for the Federal Circuit (CAFC)" (Br6). It is argued (Br6-12) that the CCPA in In re Johnson, 589 F.2d 1070, 200 USPQ 199 (CCPA 1978), In re Sherwood, 613 F.2d 809, 204 USPQ 537 (CCPA 1980), and In re Taner, 681 F.2d 787, 214 USPQ 678 (CCPA 1982) held that the signals produced by the claimed method are physical things and not merely mental constructs. It is also argued (Br11-12) that the Federal Circuit characterized the signals in Arrythmia Research Technology v. Corazonix, 958 F.2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992) as physical things. None of claims in these cases were directed to a signal per se and, thus, the cases are not controlling. We agree that signals can be a physical phenomenon, such as a voltage, or can represent a physical phenomenon. Of course, signals are not always physical things. See Walter, 618 F.2d at 770, 205 USPQ at 409 ("The 'signals'

processed by the inventions of claims 10-12 may represent either physical quantities or abstract quantities; the claims do not require one or the other."). Appellant does not say what claim language makes his signals physical. In any case, however, we conclude that a signal per se is nonstatutory subject matter even if it has a physical existence, because it is not tangible physical matter.

Appellant argues that, as to product-by-process claims 16-51, "if product-by-process claims had been presented in Johnson, Sherwood, Taner, and Arrhythmia, the court would have found such claims allowable because of: (1) the allowability of the underlying processes, and (2) the physical reality of the signals produced by the processes, as expressly stated by these courts" (Br12). In our opinion, the statutory nature of product-by-process claims is determined by the product, i.e., the signal. As discussed, it is not sufficient that signals may be physical since it is our opinion that non-tangible physical phenomena are not the types of subject matter which were intended to fall within the scope of patentable subject matter under § 101.

(2)

The examiner states (FR2): "Further certain of the claims, e.g., Claim 8, attempt to tie these emanations to a specific process or apparatus. Once a signal has left a

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transmiter [sic], nothing in that signal can tie it to a specific process or apparatus out of a plurality of apparatuses or processes which could have produced it."

Appellant interprets the examiner's statement as saying that a signal cannot be patented because there is no way to determine infringement of the process for making the signal. Appellant argues (Br13-14) :

With regard to the rejection of the product-by-process claims (claims 16 through 51) under 35 U.S.C. 101, Applicant demurs to the Examiner's statement. . . . Applicant submits that any perceived difficulty in ascertaining whether a product-by-process claim has been infringed is irrelevant to allowability of the product-by-process claim.

Appellant argues that infringement could be proved by evidence in various ways.

We do not interpret the examiner's statements to mean that the claims are directed to nonstatutory subject matter because it would be impossible to tell how the signal was produced from the signal itself. The same problem of determining infringement exists with many products that are claimed as product-by-process claims. Instead, we interpret the examiner's remarks to mean that the claims are nonstatutory subject matter because they are directed to the signal per se and do not become statutory subject matter because they may make reference to how the signal is produced. We have held that the statutory nature of the product-by-process claims is

determined by the product, here the signal per se, since there is no relevant case law on the issue.

(3)

The examiner states (FR2): "This attempt to patent free [space] signals is akin to attempting to patent an audio or television program in free space after transmission but before reception."

Appellant argues that the claimed assembly of signals should be analogized to the medium on which an audio or television program is fixed (the magnetic tape or laser disk) and not to the information contained thereon. "The signals may or may not contain information during any given time interval. The signals can exist independently of whether any information is contained therein, just as a magnetic tape can exist independently of whether any information is recorded thereon." (Br18.) "Claims 2 through 51 are directed to a medium for conveying information, and are not directed to the information so conveyed." (Br18.)

The claimed signals are directed to the arrangement of the information, and not to the information content per se. The examiner appears to be giving audio (e.g., radio or the spoken word) and television programs as examples of other types of signals which would also be nonstatutory and is not saying that the claimed subject matter is nonstatutory because of its

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information content. That is, a word in the air or a television signal in free space is nonstatutory subject matter because the signal, which has a precisely defined format and characteristics, is not tangible, not because the signal may be represent a particular piece of information, such as an episode of "I Love Lucy." We agree with the examiner's analogy of the present signals to audio and television signals existing in free space.

CONCLUSION

For the reasons stated above, the rejection of claims 2-51 is sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

LEE E. BARRETT )  
Administrative Patent Judge )  
 ) BOARD OF PATENT  
 ) APPEALS  
 ) AND  
 ) INTERFERENCES  
MICHAEL R. FLEMING )  
Administrative Patent Judge )

TORCZON, Administrative Patent Judge, concurring.

The majority's discussion of the patentability of signals per se under 35 U.S.C. § 101 is neither necessary to support the decision nor necessarily correct. It is unnecessary because assuming, arguendo, that signals per se are manufactures, they must still avoid the judicially created exceptions to section 101. State Street Bank & Trust Co. v. Signature Fin. Group Inc., 149 F.3d 1368, 1372 n.1, 47 USPQ2d 1596, 1600 n.1 (Fed. Cir. 1998) (judicially created exceptions apply to all categories of subject matter). Representative claims 2 and 16<sup>2</sup> are directed to abstract ideas, which constitute one of the judicial exceptions. Hence, we need not address whether signals are manufactures to affirm the rejection. I am reluctant to endorse a sweeping analysis under section 101 when it is not strictly necessary. I am doubly reluctant when, as here, the analysis relies on an exegesis of cases with very different facts.

Claims 2 and 16 are directed to abstract ideas

A signal is simply the conveyance of information. Whether a signal is specifically a "physical representation of data" (supra at 7) depends on the context provided by the claim. See In re Bergy, 569 F.2d 952, 960, 201 USPQ 352, 360-61 (CCPA

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<sup>2</sup> Appellant did not argue any of claims 16-51 separately. The majority properly selected claim 16 as the claim in that group that best tests Appellant's arguments. 37 CFR § 1.192(c).

1979) (focussing on the invention defined in the claim). We need not assume that a signal is an electromagnetic wave if the language of the claim does not require that construction. Cf. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (during prosecution, a claim must be given its broadest reasonable interpretation). Absent some physical context, a signal per se is an abstract idea in much the same way that a mathematical algorithm without context is an abstract idea.

The claims on appeal do not require the signal to be an electromagnetic wave (or some sort of particle for that matter). The elements of the claim require what is inherent in all signals: transmission, the possibility of reception, and information to be communicated. The information in the claims (binary spreading-code sequences) could be employed in a useful, technologically specific way, but nothing in claims 2 or 16 require such use. Appellant misses both of the safe harbors afforded under the case law: a firm linkage to physical elements or a firm linkage to a specific practical use. State Street Bank, 149 F.3d at 1373, 47 USPQ2d at 1601. Claims 2 and 16 do not specify any physical elements or any practical utility. No doubt we could infer some physical elements or practical utility from the specification, but it is not proper to interpolate elements into the claims from the specification unless such interpolation is necessary to

understand the claims. Cf. Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1248, 48 USPQ2d 1117, 1120-21 (Fed. Cir. 1998). Claims 2 and 16 have not been rejected under 35 U.S.C. § 112[2] for indefiniteness. They appear to define spreading-code signals specifically enough. Thus, interpolation by claim construction of physical context or practical utility from the specification is not necessary to understand the claim, but only to avoid the rejection under section 101. Appellant is obliged to achieve the latter goal by amendment. Cf. In re Morris, 127 F.3d 1048, 1057, 44 USPQ2d 1023, 1030 (Fed. Cir. 1997) (proper claim drafting is the applicant's responsibility).

The record does not support excluding signals from the statutory category of manufactures

Under section 101, one who invents "any new and useful ... manufacture, ... or any new and useful improvement thereof, may obtain a patent therefor". The legislative history and case law interpreting this provision make clear that section 101 is to be read expansively. E.g., State Street Bank, 149 F.3d at 1373, 47 USPQ2d at 1600 (summarizing the case law and legislative history). Neither the case law nor the legislative history specifically address the status of energy or signals per se as a type of manufacture. Hence, it would be incongruous to exclude energy or signals from the category of

manufactures absent some compelling reason or authority. The majority has provided none.

The status of energy or signals was not before the courts in any of the decisions the majority cites. Thus, any statements regarding the scope of manufactures must, to the extent they can be read to exclude energy or signals, be considered dicta. Cf. In re Ochiai, 71 F.3d 1565, 1571, 37 USPQ2d 1127, 1132-33 (Fed. Cir. 1995) (opinions are fact-specific and should not be read to create per se rules). Similarly, Congress cannot be presumed to have adopted by reenactment a statutory interpretation of which it was unaware. In re Donaldson Co., 16 F.3d 1189, 1193 n.3, 29 USPQ2d 1845, 1848 n.3 (1994) (in banc). Congress cannot have been aware of an opinion excluding energy or signals under section 101 when none existed. On the present record, there is no sufficient reason to exclude signals from the ambit of manufactures.

Correspondence to a statutory category does not, however, ensure that claimed subject matter is statutory. State Street Bank, 149 F.3d at 1372 n.1, 47 USPQ2d at 1600 n.1 (judicial exceptions apply to all of the statutory categories). For the reasons already discussed, claims 2 and 16 fall within the

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abstract-idea exception. That reason alone is sufficient to warrant affirmance of the rejection for those claims and for all claims grouped with them.

RICHARD TORCZON ) BOARD OF PATENT  
Administrative Patent Judge ) APPEALS  
 ) AND  
 ) INTERFERENCES

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Edward J. Radlo  
c/o FENWICK & WEST  
Two Palo Alto Square  
Palo Alto, CA 94306